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STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "Notes" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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COST OF OPERATING RANGE SEEDING EQUIPMENT 1/*

By George A. Myles 2/

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It has been conservatively estimated that a total area of approximately 20 million acres of deteriorated rangeland in the Intermountain Region should be revegetated, either for forage production or watershed protection. 3/

This vast area of rangeland offers a potential for greatly increasing the amount of feed produced in the Region if economical methods can be found to establish improved forage.

The cost of owning and operating range brushing and seeding equipment is not widely known, because relatively few people have done this type of work. This extract provides operational costs for several types of equipment.

Nevada range seeding contractors and ranchers were surveyed to obtain information on rates and costs of operation, and on the type of equipment used. This information was supplemented with data from studies made in other states and with repair costs and equipment prices supplied by equipment dealers.

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* Extract from Bulletin 226-September 1962 of Agricultural Experiment Station, Max C. Fleishman College of Agriculture, University of Nevada.

1/ The research was done under Western Regional Research Project W-63, "The Cost of Owning and Operating Farm Power and Machinery Used for Seedbed Operation and Tillage." The project was initiated in 1959.

2/ Assistant Agricultural Economist, Department of Agricultural Economics, University of Nevada, Reno, Nevada.

3/ A. Perry Plummer; A. C. Hull, Jr.; George Stewart; and Joseph H. Robertson, SEEDING RANGELANDS IN UTAH, NEVADA, SOUTHERN IDAHO, AND WESTERN WYOMING, Agricultural Handbook, No. 71, U. S. Department of Agriculture, Forest Service, January 1955.

RATES OF OPERATION

Average rates of operation as determined from the survey are itemized by the approximate horsepower of equipment (Table I).

A comparison of these computed rates with reported rates shows that the equipment was not used at capacity. Some explanations are that operators might have found breakage was less at lower speeds, that a slower speed produced a better job, or that equipment width was not balanced with power.

Table I

Rates of Equipment Operation

Type of equipment		Acres per hour
Brush beater, 8 ft.	50 hp tractor	2.5
Disk plow, 24 ft.	150 hp tractor	7.0
Disk, 8 ft.	50 hp tractor	3.4
Disk, 24 ft.	100 hp tractor	6.0
Disk, 30 ft.	150 hp tractor	9.0
Drill, 10 ft.	50 hp tractor	3.0
Drill, 30 ft.	50 hp tractor	9.0

COST OF OPERATING RANGE SEEDING EQUIPMENT

The total cost of owning and operating equipment has been separated into fixed and operating costs. Most operating costs occur by the hour; therefore, hourly costs are shown in Table II. These costs are converted to a per acre basis in Table III. The costs are shown for three sizes of equipment used by those interviewed. The costs are not averages, but are based on typical operations. It was impossible to obtain accurate repair costs from the small sample; therefore, secondary sources of information were used to supplement the information obtained in the survey.

Table II

Hourly Operating Cost of Range Brushing and Seeding Equipment

Item	50 DBHP Wheel tractor	100 DBHP Track tractor	150 DBHP Track tractor
Labor	$1.00	$2.50	$2.50
Fuel @ 8 cents per gal. 1/	.46	.99	1.37
Tractor repairs and lubrication 2/	.73	2.00	2.50
Brush beater repairs and lubrication 2/	.20	3/	3/
Disk plow repairs and lubrication	3/	3/	.70
Disk repairs and lubrication 2/	.20	.50	.70
Drill repairs and lubrication 2/	.55	3/	3/

1/ 80 percent of Nebraska test 4

2/ Estimated from survey data, rates reported in "Machinery Cost and Related Data", California Agricultural Extension mimeographed publication, May 1959, Bureau of Land Management equipment operation rates and local equipment repair rates.

3/ Operations not practiced by those included in survey.

Operating costs were about the same for brush beating, disk plowing, and disking with the 100 horsepower tractor. This occurred because the greater capacity of larger equipment was offset by higher wages and repair costs. The operating cost of drilling with three 10-foot drills was about one-third as high as for one drill because speed rather than power is the limiting factor. The cost of disking with a 150 horsepower tractor was lower than with a 100 horsepower tractor mainly because the same hourly cost for labor was offset by covering more acres.

Table III

Per Acre Operating Cost of
Range Brushing and Seeding Equipment 1/

Item	50 DBHP Wheel tractor	100 DBHP Track tractor	150 DBHP Track tractor
Brush beating	$0.96	2/	2/
Disk plowing	2/	2/	$1.01
Disking	.70	$1.00	.79
Drilling, 10 ft.	.91	2/	2/
Drilling, 30 ft.	.30	2/	2/

1/ Based on rates of operation shown in Table I and hourly costs in Table II.

2/ Operations not practiced by those included in survey.

Fixed costs, interest, taxes, insurance, and depreciation vary with the original investment and acres covered during the life of the equipment. Another cost that becomes fixed after a job has been bid is the cost of transporting equipment.

Fixed costs based on typical investments found in the survey are shown in Table IV.

Table IV

Fixed Costs Per Acre of Range Brushing and Seeding Equipment 1/

All fixed costs 2/	50 DBHP equipment	100 DBHP equipment	150 DBHP equipment
Tractor	$0.59	$0.69	$0.67
Plow	3/	3/	.15
Disks	.21	.23	.15
Brush beater	.15	3/	3/
Drills -			
One drill	.11	3/	3/
Three drills	.33	3/	3/

1/ The annual expense was divided by 1,000, 2,000, and 3,000 acres for the 50, 100, and 150 horsepower equipment to get the cost per acre.

2/ Depreciation was charged at 14.3 percent, interest at 3 percent per year, and insurance and taxes at 1 percent of the original value. The investment for the 50 horsepower equipment was: tractor, $3,200; brush beater, $840; disk, $1,160; drill, $600. For the 100 horsepower equipment, investment was: tractor, $7,500; disk, $2,500; and for the 150 horsepower equipment, investment was: tractor, $11,000; plow, $2,500; and disk, $2,500.

3/ Operations not practiced by those included in survey.

The fixed costs per acre shown in Table IV are not greatly different for various sizes of equipment. This is true only because the higher costs of the larger equipment were divided by more acres. If annual costs had been divided by the same number of acres, the per acre fixed costs of small equipment would have been proportionately smaller.

The greater economical operating efficiency of larger equipment is offset by higher fixed costs and additional costs of transportation. The total effect depends on the number of acres covered. The following examples from the budget illustrates this point. All contractors

used wheel tractors to pull their drilling equipment. The cost of drilling with one 10-foot drill and with three 10-foot drills is shown under the 50 horsepower tractor in Table V. Under the assumptions used in this budget, there was a saving of 61 cents per acre on operating cost; however, there was an increase of 22 cents per acre on fixed cost due to using three drills instead of one. If only one-third as many acres were drilled, the fixed cost per acre would have been three times as high and the increase in fixed costs would have been 66 cents. In this case it would be more economical to drill with one drill.

Table V

Total Cost of Seedbed Preparation and Seeding

Item	50 HP equipment	100 HP equipment	150 HP equipment
Brush beating	$1.70	1/	1/
Plowing	1/	1/	$1.83
Disking	1.50	$1.92	1.61
Drills -			
One 10 ft. drill	1.61	1/	1/
Three 10 ft. drills	1.22	1/	1/

1/ Operations not practiced by those included in survey.

The total costs in Table V were obtained by adding the fixed costs in Table IV to the operating costs in Table III. The assumptions used in obtaining these costs should be kept in mind when using the tables. For example, if disking was done twice, the fixed costs per acre would be only half as much if the equipment was used over twice as many acres. Under this assumption, the total cost of disking twice with 100 horsepower equipment would be $2.92, rather than $3.84, the cost obtained by doubling the figure in the table. Transportation costs would also have to be added to the figures shown. The cost of management has not been included; consequently, any profit computed with these budgets should be regarded as a return to management.

CONTRACT COSTS

Much of the range seeding in Nevada has been done under contract from the Bureau of Land Management. Contract costs were obtained from the Bureau to check the budgeted costs. These costs are shown in Table VI.

The contract costs for plowing usually included going over the land twice. (Plowing is interpreted as either plowing or disking.) In general, the contract costs are lower than budgeted costs obtained by doubling the costs in Table V, but are less than twice the operating cost plus the fixed cost in Table IV. This would indicate that contractors were spreading their fixed costs over more acres than are shown in the budget, or are not charging for all fixed costs.

Table VI

Contract Prices for Plowing and Seeding

Area	Acres per contract	Contract Price Per Acre		
		Plowing	Seeding	Plowing and seeding
Elko, Nevada district 1/	3,040	$3.03	$1.03	2/ $4.06
	1,730	3.13	.93	3/ 4.06
	2,382	2.90	.90	3/ 3.80
	5,250	3.00	.97	3/ 3.97
	1,800	3.10	1.14	3/ 4.24
	2,686	3.00	1.00	2/ 4.00
	10,000	4/	4/	2/ 4.24
Ely, Nevada district 5/	3,230	4/	.85	4/
	2,000	--	--	2/ 5.94
	2,550	4/	4/	2/ 5.25
	1,000	3.69	4/	4/
	1,200	4.65	4/	4/

1/ Data supplied by District Office, Bureau of Land Management, Elko, Nevada.

2/ Bid for plowing and seeding combined.

3/ Bid for plowing and seeding separate.

4/ Information not reported.

5/ Data supplied by District Office, Bureau of Land Management, Ely, Nevada. Data is for 1960 and 1961.

Table VI (cont'd.)

Contract Prices for Plowing and Seeding

Area	Acres per contract	Contract Price Per Acre: Plowing	Seeding	Plowing and seeding
Idaho 6/	7/ 1,359	7/ $3.22	4/	4/
	2,138	4/	$1.47	4/
Nevada 6/	7/ 2,015	7/ 3.47	4/	4/
	7/ 2,021	4/	1.26	4/

6/ Data supplied by Bureau of Land Management, Administrative Field Office, Salt Lake City, Utah.

7/ July 1, 1959-June 30, 1960, average costs and average number of acres per contract.

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If the rascals
knew the advantages
of virtue
they would become
honest men.

- - Benjamin Franklin

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If you would not
be forgotten
either write things
worth reading
or do things
worth writing.

- - Benjamin Franklin

TIMING VITAL IF SAGEBRUSH GETTING 2,4-D

By Dr. C. Wayne Cook*

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Spraying sagebrush with 2,4-D, one of the best ways of increasing grass production available to range country ranchers, can be largely a waste of labor and material if not properly timed.

Success on dry foothill ranges has been sporadic. Some ranchers have been disappointed by the results even though they followed recommended practices very carefully.

These failures probably come from spraying according to the calendar rather than close observation of the growing condition of the plants. To get good results from spraying big sagebrush, the plants must be in a state of rapid growth.

In foothill areas of central Utah, favorable soil moisture and atmospheric temperature for optimum kill of big sagebrush with herbicides usually occur during the last 10 days of May. Generally the application of spray after June 5 on foothills and June 10 on mountain ranges will not give satisfactory results.

A dry or cold spring would make it unwise to spray at any date.

The Utah Agricultural Experiment Station conducted a study in 1958 to 1963 near Eureka, Utah, along this line. Where soil moisture was about 12.5 percent in the upper one foot of soil and maximum daytime temperatures were at least 70 degrees and temperature at night didn't go below 40, control of big sagebrush was good.

With that much moisture, the clay loam soil in this experimental area felt moist to the touch, but one could not roll it into a solid ball with the hands. Plants get their moisture more easily from silt loam soil or sandy loam soil than from clay loam soil. Moisture at 10.5 percent in silt loam soil and 5.5 percent in sandy loam is just as available to plants as 12.5 percent moisture in clay loam soil.

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* Research Professor, College of Forest, Range, and Wildlife Management, Utah State University.

The growth of sagebrush in rangeland seeded to grass is a constant problem to ranchers, even where control is nearly perfect. Control of big sagebrush on foothill land seeded to grass will likely be necessary every 10 years, or at least every 20 years. The better your initial kill of sagebrush, the less often you have to go back and do the job again.

Grazing intensity also affects the rate of sagebrush increase in seeded areas. Conservative or light use will prolong the time until control is necessary.

Competition for water is great where sagebrush and grass grow together. The more water used by the sagebrush, the less there is for grass. This fact was demonstrated when big sagebrush was controlled on both mountain range and seeded foothill range. Even though there was only a 20 percent cover of grass, production of forage increased 525 pounds per acre following control of brush with herbicide. That was without seeding any more grass.

Crested wheatgrass seeded in 1951 following control of sagebrush by plowing produced 780 pounds of air dry grass per acre in 1953. However, by 1958, the small amount of big sagebrush which was not killed by plowing had increased and the grass yield was cut back to about 300 pounds. There was no such increase in the big sagebrush on land nearby which was plowed twice and sagebrush was controlled nearly 100 percent.

If you are interested in determining soil moisture levels, check with your local Soil Conservation Service specialists or your County Agent.

IDAHO FARMER, May 16, 1963

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Half the truth
is often a great lie.

- - Benjamin Franklin

THE WIDEST PLOW IN THE WORLD . . . .

When Texas' famed King Ranch, Kingsville, acquired cattle ranching properties in Australia, ranch officials and staff personnel know they had also acquired a huge ranch and pasture improvement job; one that would require special equipment.

Their answer?

To Australian manufacturing concerns they sent designs and specifications of a 100-ft. -long one-way disc chain plow which had been successfully used on some of the firm's other holdings.

The plow consists of carbon steel discs fitted to every alternate link of a 100-ft. anchor chain. Three walking discs, two at each end of the plow and one in the middle are important to the proper operation of the plow which is pulled by two D9 Caterpillar tractors, one on each end.

Each disc is three-quarters of an inch thick, 22 inches in diameter, has a 2-inch bevel, and weighs 74 pounds. The chain consists of 2-1/2-inch diameter stud link cable. Discs are spaced 24 inches apart.

Speed of the plow depends, naturally, on terrain, type and thickness of vegetative cover. After soil has been bared by the long plow, adapted grasses are seeded by airplane.

Information on the cost of the plow itself, the cost of operating it, was not available. Obviously a refinement of the "chain-drag" principle of brush control, the 100-ft. chain plow should work well in areas where soil is deep and plowing is necessary to establish new stands of grass.

WESTERN LIVESTOCK JOURNAL, Pacific Slope Edition, March 1963

THE WIDEST PLOW IN THE WORLD

WYOMING CATTLE RECORDS PROVE GRAZING RATE AFFECTS PROFIT

By Albert P. Thatcher
Soil Conservation Service

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Economists frequently write about the cost and return aspects of ranching in the West. Rangemen talk about good range management and compare it with the poor kind. The economist discusses the cost of keeping a breeding animal and the returns from her as a divident-paying investment. The rancher considers acreages of vegetation and the number of animals using it.

But there is an in-between area that represents a meeting ground for the economist and the rangeman. This is the cost and return from range vegetation under different grazing uses.

Wyoming ranchers have known for a long time that you can have too many animals for the good of your range. Many have learned that profit may not depend so much on the number of cows as on how you take care of the grass year after year.

A group of Wyoming cattlemen, drawing on their own experiences and records, have arrived at some sound answers to the question of just how much can be taken from grass resources and get the most in return.

First, there was the group which reported using range resources almost to the hilt - within 70-80 percent of the total. The livestock - figured in animal units - totaled 923 head. These included 700 cows and 200 yearling heifers; the rest were bulls, steers, and horses.

Calf crop of this group amounted to 75 percent. Gross income totaled $61,280 from the sale of calves, heifers, yearling steers and a few dry cows and bulls.

However, expenses were in keeping: interest on investment was $9,240; winter feed, $31,382; veterinary expense, $1,385; equipment, $8,400; and marketing, $5,290. A few other routine but inescapable expenses, such as taxes, fencing, leases, and such, ran the expenses to $72,403.

This group wound up its operation $17,281 "in the red."

The second group of ranchers leaned in the opposite direction in the use of their range. They reported grazing only 25-50 percent to allow for rapid range improvement in good years and for plenty of grazable old growth in unusually dry seasons.

This group reported 460 animal units - 350 cows, 100 yearling heifers, 25 yearling steers and so on. This group's calf crop percentage was 86. Weights of animals sold were above those reported by the first group.

The big difference, though, seemed to be in the expense column. For example, where the first group spent over $31,000 for hay and cake, the second spent only $7,000. Other expenses were in the same order - $4,608 for interest, $4,800 for labor, $920 for taxes, $4,700 for equipment and $3,481 for marketing. Fixed costs of $6,158 were the same as for the other group.

So, although gross income through the sale of stock amounted to only $41,542, lower expenses made possible a profit of $6,540 for the year.

Range specialists and economists generally agree that the most profitable degree of range use is in the area known in conversation circles as "proper use". This provides for grazing animals taking no more than about 50 percent of the year's growth by weight.

WESTERN FARM LIFE, January 1, 1963

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ACCIDENT SYMPTOMS:

Heavy foot
Light head.

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SAFETY is a responsibility
of management.